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10/594,253	09/25/2006	Shinji Inagaki	296761US0PCT	7399

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OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, L.L.P.
1940 DUKE STREET
ALEXANDRIA, VA 22314

EXAMINER

BOHATY, ANDREW K

ART UNIT	PAPER NUMBER
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1786

NOTIFICATION DATE	DELIVERY MODE
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04/19/2010

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentdocket@oblon.com
oblonpat@oblon.com
jgardner@oblon.com

Office Action Summary	Application No. 10/594,253	Applicant(s) INAGAKI ET AL.	
	Examiner Andrew K. Bohaty	Art Unit 1786	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 January 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 and 8-20 is/are pending in the application.
- 4a) Of the above claim(s) 15, 19 and 20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5 and 8-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 January 2010 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This Office action is in response to the amendment filed January 19, 2010, which amends claims 1-5 and 8-18 and cancels claims 6 and 7. Claims 1-5 and 8-20 are pending. Claims 15, 19, and 19 are withdrawn as being drawn to a non-elected group and species.

Response to Amendment

2. All the objection to the drawings as set forth in the Office action mailed October 16, 2009 is overcome due to submission of new drawing sheets.

Response to Arguments

3. Applicant's arguments filed January 19, 2010 have been fully considered but they are not persuasive.

4. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., mesostructure) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

5. The applicant's claim in claim 1 that the luminescent material contains mesopores between 1 to 30 nm and Shea et al. (J. Am. Chem. Soc. 1992, 114, 6700-6710) (hereafter "Shea"), Shea et al. (Chem. Mater. 1989, 1, 572-574) (hereafter "Shea 1989"), and Fan et al. (US 2003/0039744) (hereafter "Fan") all show luminescent

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material made from of the applicant's preferred siloxanes, BTEB, contains pores between 1 nm and 3 nm. Furthermore, Shea discloses that they "we intrigued by the possibility of "engineering" porosity in materials by assembling molecular sized building blocks into a three-dimensional scaffolding" (page 6701 left column second paragraph). Also, the applicant's argue that the luminescent materials need to have benzene periodicity and a difference in energy between a ground state and excited stat is 40-140 kcal/mol, but these limitations are only needed for claims 4 and 5. The applicant's also show that polymers made from only BTEB creates a polymer with benzene periodicity and a difference in energy between a ground state and excited stat is 40-140 kcal/mol (see page 54 lines 24-26, page 55 lines -126, and page 56 lines 1-11 in the specification); therefore, the siloxane polymers in Shea and Shea 1989 would inherently have these properties. With regards to Fan, Fan discloses the mesoporous silica made with BTEB is done using a basic surfactant, CTAB, (paragraphs [0131]-[0132]) this is similar to applicant's Ph-HMM-c, which displays a difference in energy between a ground state and excited stat is 40-140 kcal/mol, and since the applicant's show that the basic surfactant leads to mesoporous silica with a difference in energy between a ground state and excited stat is 40-140 kcal/mol, the silica polymer taught by Fan would inherently have this property because the materials were made in very similar processes and would be expected to give similar results.

6. In response to applicant's argument, on pages 11-13, that that the silica matrix using TEOS is substantially different from the silica matrix using the organic siloxane compounds claimed by the applicant, the test for obviousness is not whether the

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features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

7. Both the compounds disclosed and claimed by the applicant and TEOS form a silica matrix through condensations reactions, whether the reaction is either acid or base catalyzed. Furthermore, when two molecules of TEOS dimerize during the making of the silica matrix they have a similar structure of applicant's BTEB, where there are two siloxanes dimerized together and have a total of 6 reactive groups to further react with additional siloxanes. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the siloxanes taught by Shea instead of TEOS. Both siloxanes are known to be used as a starting material to make a silica matrix and both would lead to a silica matrix when used as a starting material.

Drawings

8. The drawings were received on January 19, 2010. These drawings are acceptable.

Claim Rejections - 35 USC § 112

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claims 1-5, 8-14, and 16-18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

11. Regarding claim 1, the phrase "comprising a polymer of an organic silicon compound represented by the following formula (1)" is unclear. The term "comprising" would mean that it contains the formula. However, this does not appear to be correct. It is unclear if polymer is made from the organic silicon compound of general formula (1) or if the polymer further comprises a compound of general formula (1) as part of the mixture.

12. After reading the specification it appears that compounds of applicant's general formula (1) are used as a starting material to make the polymer. The examiner will interpret the claim as the polymer is made from compounds represented by applicant's general formula (1).

13. Claims 2-5, 8-14, and 16-18 are rejected due to their dependence on claim 1.

Claim Rejections - 35 USC § 102

14. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

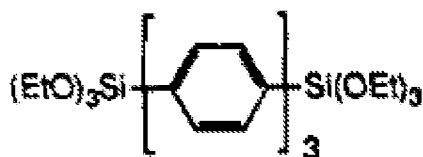
A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

15. Claims 1-5 are rejected under 35 U.S.C. 102(b) as being anticipated by Shea et al. (J. Am. Chem. Soc. 1992, 114, 6700-6710) (hereafter "Shea").

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16. Regarding claims 1-3, Shea discloses a siloxane polymer made from the



following monomer,

, (page 6701, left column scheme at

the bottom of the column and scheme 1) which reads on formula (1) in claim 1, where X is benzene (an applicants' preferred fluorescent molecule that can be excited by light), R¹ is ethoxy (claim 2), n is 3 and m is 2 (claim 3). Shea discloses that siloxane polymer is porous and the mean pore diameter is 2.4 nm (page 6703 Table I, example X-1-A, page 6702 right column paragraph 4).

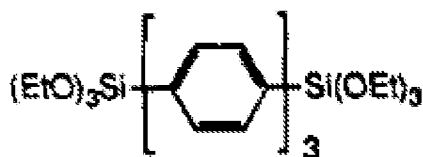
17. Regarding claim 4, although Shea does not specifically disclose wherein the difference in energy between the ground state and any of a singles excited state and a triplet excited is 40 to 140 kcal/mol the siloxane polymer from above inherently has this property. Also, the above siloxane polymer/monomer is an example of the applicants which contain this property (applicant's Ph-Si).

18. Regarding claim 5, Shea discloses the siloxane polymer using the above monomer has a structure with a regular spaced array (page 6701, left column, paragraph 3, Figure 1B). Since the monomer is a benzene ring the period would be less than 5 nm, because benzene has a length smaller that 5 nm.

19. Claims 1-5 are rejected under 35 U.S.C. 102(b) as being anticipated by Shea et al. (Chem. Mater. 1989, 1, 572-574) (hereafter "Shea 1989").

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20. Regarding claims 1-3, Shea 1989 discloses a siloxane polymer made from the



following monomer,

, (573 left column, scheme in the

middle of the page, paragraph 1, compounds 3a and 3z) which reads on formula (1) in

claim 1, where X is benzene (an applicants' preferred fluorescent molecule that can be

excited by light), R¹ is ethoxy (claim 2), n is 3 and m is 2 (claim 3). Shea 1989 discloses

that siloxane polymer is porous and the mean pore diameter is 2 nm or smaller (573

right column, paragraph 1).

21. Regarding claim 4, although Shea 1989 does not specifically disclose wherein

the difference in energy between the ground state and any of a singles excited state

and a triplet excited is 40 to 140 kcal/mol the siloxane polymer from above inherently

has this property. Also, the above siloxane polymer/monomer is an example of the

applicants which contain this property (applicant's Ph-Si).

22. Regarding claim 5, Shea 1989 discloses the siloxane polymer (page 573

compound 3z) using the above monomer has a structure with a regular spaced array by

introduction of the organic spacer (benzene molecule) (page 572, right column

paragraph 2, Figure 2). Since the monomer is a benzene ring the period would be less

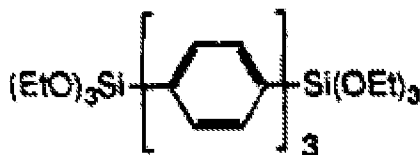
than 5 nm, because benzene has a length smaller that 5 nm.

23. Claims 1-4 and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by

Fan et al. (US 2003/0039744) (hereafter "Fan").

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24. Regarding claims 1-3, Fan teaches a siloxane polymer made from the following



monomer, , (paragraph [0131], Fig. 3) which reads on formula (1) in claim 1, where X is benzene (an applicants' preferred fluorescent molecule that can be excited by light), R¹ is ethoxy (claim 2), n is 3 and m is 2 (claim 3). Fan discloses that siloxane polymer is porous and the pore diameter is 1.7 nm – 2.4 nm (paragraph [0136]).

25. Regarding claim 4, although Fan does not specifically disclose wherein the difference in energy between the ground state and any of a singles excited state and a triplet excited is 40 to 140 kcal/mol the siloxane polymer from above inherently has this property. Also, the above siloxane polymer/monomer is a preferred example of the applicants which contain this property.

26. Regarding claim 16, Fan discloses the siloxane polymer can be made in a thin film (paragraphs [0132] and [0133]) and further discloses that a thin film is a film with a thickness in the range of 50 nm to 1 μm (paragraph [0060]).

Claim Rejections - 35 USC § 103

27. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

28. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

29. Claims 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shea et al. (Chem. Mater. 1989, 1, 572-574) (hereafter "Shea 1989") as applied to claims 1-5 above, and further in view of Bartl et al. (Chem. Commun. 2002, 2474-2475) (hereafter "Bartl").

30. Regarding claims 8-11, Shea 1989 does not teach wherein the porous siloxane polymer comprises another luminescent compound, where that compound is phosphorescent and the compound is "adsorbed on", "bonded to", "filled in" or "mixed with" the polymer, and wherein the siloxane polymer with the additional luminescent compound further comprises a surfactant. Shea 1989 does teach the use of the siloxane polymers in optics (page 574 left column paragraph 2).

31. Bartl teaches the encapsulation of rare earth material complexes in sol-gel derived composites (page 2474 left column paragraph 1). Bartl teaches the sol-gel derived composites include mesoporous silica and these materials are used for there optical properties (page 2472 left column paragraph 2). Bartl teaches the rare earth metals compounds to be Eu and Tb containing (page 2474 left column 2 paragraph), which are well known phosphorescent compounds (claims 11 and 14). Bartl teaches

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that when the phosphorescent rare earth metal complexes are mixed with the siloxane polymer and the polymer made further comprises a surfactant (P123) (claims 9, 10 and 13) (page 2474 left column paragraph 3). Bartl further teaches that the light emitted from the mesoporous structure is more pure than light emitted from sol-gels that do not have the mesoporous structure (page 2475 left column last paragraph).

32. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the siloxane polymer of Shea 1989, so when the polymer was made the synthesis included a surfactant and a rare earth metal compound (phosphorescent material) was included, so the resulting polymer contained an additional phosphorescent compound mixed with the polymer and the polymer further comprised a surfactant. The motivation would have been to make a siloxane polymer structure that emits light with a higher purity. Both Shea 1989 and Bartl teach the use of their sol-gels for use in optics, while Bartl teaches the incorporation of phosphorescent materials into the sol-gel network and that mesoporous structure displays better light purity than other mesoporous structures.

33. Claims 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shea et al. (Chem. Mater. 1989, 1, 572-574) (hereafter "Shea 1989") as applied to claims 1-5 above, and further in view of Matthews et al. (Chem. Mater. 1993, 5, 1697-1700) (hereafter "Matthews").

34. Regarding claims 12-14, Shea 1989 does not teach a siloxane polymer further comprising a fluorescent compound, wherein the fluorescent compound is

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phosphorescent and the compound is "adsorbed on", "bonded to", "filled in" or "mixed with" the polymer. Shea 1989 does teach the use of the siloxane polymers in optics (page 574 left column paragraph 2).

35. Matthews teaches a sol-gel (siloxane polymer) that contains a Eu complex (although not taught by Matthews, Eu complex are known to be phosphorescent) mixed with the polymer (page 1698, right column paragraph 3) (claims 13 and 14). Matthews teaches the doped sol-gel produce red color and have high efficiency and can be used as optical sources (page 1700 entire page).

36. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify to siloxane polymer of Shea 1989 to include the Eu to provide a siloxane polymer with an additional phosphorescent material mixed with the siloxane polymer. The motivation would have been to produce a siloxane polymer that emits red light and can be used as a optical source.

37. Claim 18 rejected under 35 U.S.C. 103(a) as being unpatentable over Shea et al. (Chem. Mater. 1989, 1, 572-574) (hereafter "Shea 1989") as applied to claims 1-5 above, and further in view of Mashita et al. (JP 2000-306669) (wherein machine translation is used as English equivalent) (hereafter "Mashita") and Corriu et al. (Chem. Commun. 1996, 1845-1846) (hereafter "Corriu").

38. Regarding claim 18, Shea 1989 does not teach wherein the siloxane polymer further comprises an electric charge transporting material.

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39. Mashita teaches a sol-gel (siloxane polymer) comprising a luminescent material and an electron transporting material (paragraph [0067]). Mashita teaches the use of the sol-gel in electroluminescent devices (paragraph [0011]). Mashita teaches the mixed sol-gel proved an electroluminescence device that is very efficient and long lifetime (paragraph [0009]).

40. Corriu teaches the use of bridged siloxane polymers can be used in light emitting diodes (page 1845 left column first three paragraphs).

41. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the siloxane polymer of Shea 1989 to include an electron transporting material in the polymer and use the material in an electroluminescent device. Mashita teaches the use of sol-gel in electroluminescent devices, while Corriu teaches that bridged siloxane polymers could be used in light emitting devices and Shea 1989 teaches the use of bridged siloxane polymers comprising of that benzene molecule as the bridging component. The motivation would have been to produce a siloxane polymer that could be used in a light emitting device and be very efficient and have a long lifetime.

Conclusion

42. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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43. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

44. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew K. Bohaty whose telephone number is (571)270-1148. The examiner can normally be reached on Monday through Thursday 7:30 am to 5:00 pm EST and every other Friday from 7:30 am to 4 pm EST.

45. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, D. Lawrence Tarazano can be reached on (571)272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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46. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/A. K. B./
Andrew K. Bohaty
Patent Examiner, Art Unit 1786

/D. Lawrence Tarazano/
Supervisory Patent Examiner, Art
Unit 1794